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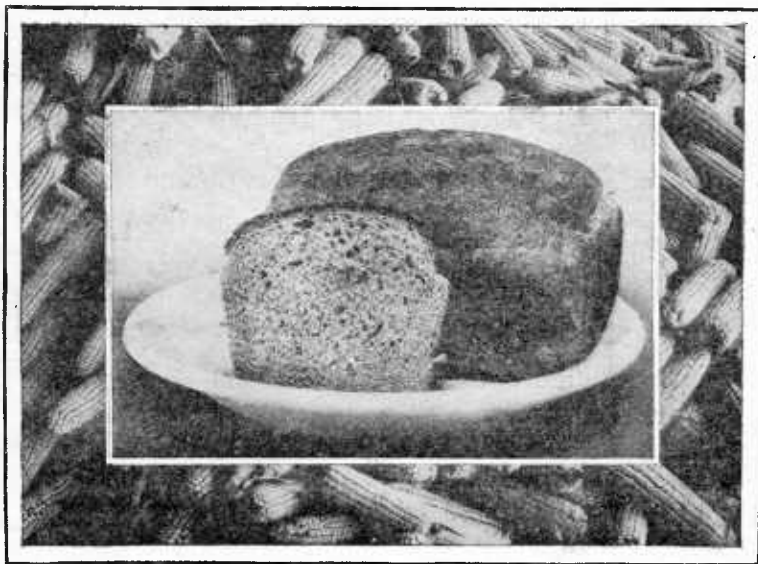


CORN MEAL AS A FOOD AND WAYS OF USING IT

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INDIAN CORN, or maize, the Nation's most abundant cereal, is palatable and nutritious. It was once the main dependence of the people and has always been a favorite food. In the hands of skillful cooks, many recipes for preparing it acceptably have been devised and this has increased its use.

Cereals as a class, and particularly in the simpler forms, such as flours and meals, are comparatively low-priced foods; in fact, the most economical of the safe and satisfying ways of rationing a family is to use cereal dishes as freely as possible without making the diet one-sided. But if cereals are to be used in this way there must be variety both in the kinds chosen and in the ways of preparing them.

This bulletin points out some of the special qualities of corn meal and tells how to use it in a variety of ways.

Contribution from the States Relations Service

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CORN MEAL AS A FOOD AND WAYS OF USING IT.

CONTENTS.

	Page.		Page.
Composition of corn and corn meal.....	4	Cooking of corn meal—Continued.	
Structure of the corn kernel.....	5	Corn-meal puffs, griddlecakes,	
Methods of milling.....	6	and waffles.....	17
Selection and care of corn meal.....	7	Corn-meal mushes.....	18
Uses of corn meal.....	7	Corn meal and meat dishes.....	20
The cooking of corn meal.....	9	Corn-meal puddings.....	21
Corn-meal bread.....	10	Corn-meal cakes.....	22



CORN MEAL long has been an important food material in this country. Its use in the diet should be increased. How to use it to the best advantage calls for some knowledge of its nature, properties, and food value, and also some understanding of the possibilities of its use as compared with other foods which make up the ordinary diet.

If the meals of the ordinary family are analyzed, each will be found to contain one or more foods from each of the following groups:

(1) Vegetables and fruits. Without these there is danger that the diet may be lacking in mineral matter and other substances needed in the making of tissues and for keeping the body in health.

(2) Milk, cheese, eggs, meat, fish, and dried legumes (peas, beans, etc.). Without these the diet is sure to lack some of the materials needed to make body protein, which is found in all the tissues.

(3) Cereals (wheat, oats, rye, corn, barley, and rice) and their products. Without these the diet would contain practically no starch, the cheapest kind of body fuel, and would also fall short of the total amount of protein required for tissue making, unless the foods listed under (2) are used more freely than is desirable for economy or health.

(4) Sugar, molasses, sirups, honey, and other sweets. Without these the diet would be lacking in sugar, valued as body fuel and for its flavor.

(5) Fats (butter, lard, meat fat, and olive, peanut, cotton seed, and other fats and oils). Without such fats, which have a high value as body fuel and give to food an agreeable quality commonly called "richness," the diet would be lacking in a needed component.

If all these groups are regularly represented in rational amounts among the foods selected, the diet will contain all the substances needed for health. The amounts needed from each group are given in other bulletins of this series along with practical suggestions for planning meals to meet the needs of the body.¹

Corn meal belongs in the cereal group and hence among the starchy foods, although supplying a considerable amount of protein and some fat and mineral matter.

COMPOSITION OF CORN AND CORN MEAL.

The table which follows shows the average composition of corn grain of different sorts and corn meal of different kinds.

Average composition of corn and corn meal.

Kind of material.	Water.	Protein.	Fat.	Carbohydrate.		Mineral matters.	Fuel value per pound.
				Starch, sugar, etc.	Crude fiber.		
	<i>Per cent.</i>	<i>Per cent.</i>	<i>Per cent.</i>	<i>Per cent.</i>	<i>Per cent.</i>	<i>Per cent.</i>	<i>Calories.</i>
Corn, whole grain, average.....	10.8	10.0	4.3	71.7	1.7	1.5	1,795
Corn, white.....	11.4	10.8	5.0	68.8	2.5	1.5	1,690
Corn, yellow.....	11.9	10.7	4.8	68.9	2.2	1.5	1,690
Corn meal (whole-grain ground), unbolted.....	12.0	8.7	4.7	71.1	2.2	1.3	1,850
Corn meal (whole-grain ground), bolted.....	12.0	8.9	4.9	72.0	1.2	1.0	1,765
Corn meal, granulated (new process).....	12.5	9.2	1.9	74.4	1.0	1.0	1,770
Corn flour (i. e., finely ground and bolted corn meal).....	12.6	7.1	1.3	77.5	.9	.6	1,645

Compared with the average composition of the common foodstuffs which make up the diet of the majority of people—meat, dairy products, vegetables, fruits, etc.—corn has a low water content, a low fat content, a fairly high protein content, a very high percentage of carbohydrate (chiefly starch), and very close to the average amount of mineral matter.

For ordinary purposes it will be sufficient to think of the composition of corn in terms of tenths: Seven-tenths being starch; one-tenth, protein; one-tenth, water; the other tenth being about half fat and half crude fiber and mineral substances.

A detailed comparison of the composition of Indian corn and other cereal grains (wheat, rice, oats, rye, barley, Kafir corn, millet, and buckwheat) shows that these cereals differ little among themselves in composition—so little, in fact, that except where great exactness is sought they may be considered as a group of interchangeable foods so far as their nutritive value is concerned. The average percentage of protein in them is 11, the extremes being 8 and 13 per cent. Indian corn, which has on an average 10 per cent pro-

¹ U. S. Dept. Agr., Farmers' Buls. 808 (1917), 817 (1917), 824 (1917).

tein, falls slightly below the average for the group. Its value as a source of energy to the body on the other hand, is the highest of all the cereals included in the list, being approximately 1,800 calories per pound, or about 100 calories above the average. An explanation of this is found in the percentage of fat, which is 4.3 per cent, the average in the cereals being about 2.5 per cent.

As regards color, there are many varieties of corn—white, yellow, red, blue, and black. There is also some difference in the flavor of the different sorts, but, contrary to common belief, these varieties are, on the average, practically identical in composition, and differ little in nutritive value. White corn is, as a rule, milder in flavor than yellow. The preference for one sort or another, however, is a personal matter, and seems to be determined very largely by locality. White corn is preferred generally in the Southern States and in Rhode Island and yellow in the Northern States as a whole, and the blue, black, and red always have been used very largely in the Southwest, where Spanish influence is marked.

Changes in modern milling methods, with corresponding differences in the characteristics of corn meal, have given rise to the terms “old-process meal” and “new-process meal.” As is the case with wheat flours, the character of the meal is influenced largely by the amount of the different parts of the grain retained in it.

STRUCTURE OF THE CORN KERNEL.

A grain of corn is by no means uniform throughout in composition, but is made up of many parts differing greatly among themselves, not only in texture and consistency, but also in chemical composition. In general, it is sufficient to consider the kernel as consisting of three parts—skin, germ, and endosperm. The skin constitutes about 6 per cent of the whole weight of the kernel; the germ, which contains the embryo from which under favorable conditions new life will spring, about 10 per cent; and the endosperm, which is the storehouse of food for the new plant, about 84 per cent.

An idea of the differences in composition between the different parts may be gained from data obtained with one variety of corn, which may be regarded as typical. According to these figures, protein constitutes 5.5 per cent of the skin, 15.3 per cent of the germ, and 9.2 per cent of the endosperm. Fat constitutes 1.4 per cent of the skin, 20.8 per cent of the germ, and 1.1 per cent of the endosperm. Sugar and starch (chiefly starch) constitute 62.8 per cent of the skin, 31.5 per cent of the germ, and 84 per cent of the endosperm. Crude fiber constitutes 13.9 per cent of the skin, 2 per cent of the germ, and 0.5 per cent of the endosperm. To put the matter in another way, the skin contains 51 per cent of all the crude fiber in the

kernel, the endosperm contains 90 per cent of all the starch, and the germ contains 16 per cent of the protein and 65 per cent of the fat. Removing the whole skin, therefore, would take away only six one-hundredths of the whole weight of the kernel, but more than half the fiber. This would, of course, leave the remaining portion of the grain with a much smaller percentage of fiber than the kernel had originally. When the germ is removed, as it often is, by modern milling processes, the effect is to take away only one-tenth of the whole weight of the kernel but more than six-tenths of all the fat and one-sixth of the protein. The removal of the skin and the germ, therefore, would tend to reduce materially the percentages of cellulose and fat and somewhat the percentage of protein in the meal.

METHODS OF MILLING.

It has always been found necessary to soften the ripe, dry corn to make it edible and the most common way of doing this is to crush it, the grain being sometimes parched or soaked so it would crush more easily. This was accomplished in the early times by pounding in a hollow log or by means of stones. Under most primitive conditions these stones were worked by hand. Later they were turned by water power, and the meal produced in this manner is called "water ground."

When the whole grain was crushed the resulting meal contained, of course, all of the skin, much of which is hard and unsuited for food. A second step in producing an edible and palatable product, therefore, was to remove the bran so far as possible. This was done in early times by means of sieves and similar devices, or by winnowing, but the removal was far from complete, and the resulting meal did not differ greatly in chemical composition from the original grain; it was simply more convenient for use.

The removal of the bran by these primitive methods was somewhat wasteful, for much of the interior of the grain also was removed. Of late a method has been devised for kiln-drying the grain, after which the skin can be removed in one piece.

The fat in the germ, which, when separated, is called corn oil and is used in many ways in the arts and for culinary purposes, is peculiarly liable to become rancid. For this reason the older types of meal, which contained all the germ fat, were hard to keep in good condition. Modern milling processes, which substitute steel rollers for stones, flatten the germ without breaking it, thus making it possible to remove it whole. The effect of the removal of the skin and germ, as has been said, is to reduce very materially the percentages of fat, cellulose, and mineral matter, and to some degree the percentage of protein. The removal of the germ, however, and the kiln-drying of the meal, which lessens or destroys molds and decay-

producing bacteria, are not without their advantages, for they have the effect of improving the keeping quality of the meal.

It is an old custom to grate new corn and use it like meal in cooking. Home-ground, or rather pounded, corn, either fresh or parched, was also common. If desired, one can grind corn at home to-day in a hand mill or can crack it like hominy by putting it through a meat chopper.

SELECTION AND CARE OF CORN MEAL.

There are two general kinds of corn meal, the granular, or "new process," and the so-called "water ground," or "old process." The granular is more used in the North, the water ground in the South, though the latter is also well known in many parts of the North. The granular meal is milled from kiln-dried degermed corn between rollers which may become quite hot during the process, and is bolted. It feels dry when rubbed between the fingers. It is convenient for use, for it keeps well and is suitable for making corn breads which contain baking powder or eggs, or in which the corn meal is combined with wheat. For some sorts of cooking it requires softening by scalding (see p. 10). The water-ground meal is prepared very generally from white dent corn which has been neither kiln-dried nor degermed. It is milled between stones which are not allowed to reach a high temperature, and may or may not be bolted. It is not so dry as the granular meal and feels softer or more flour-like to the touch. While it can be used in cooking all sorts of corn bread, it is particularly suitable for the simpler forms of bread which consist chiefly of meal, shortening, and water or milk. When used in such breads, however, it should not be ground too finely.

Since corn meal spoils rather easily, special attention should be given to the way in which it is stored. It should be kept in a cool, dry place, and should be closely covered to exclude insects. This applies to the mill and the shop as well as the home. The "water-ground" meal spoils more easily than the granular meal. When convenient, therefore, it should be milled only in small quantities as needed.

USES OF CORN MEAL.

Investigations made by this department show that more than 60 per cent of the food consumed by the people of the United States, on an average, is of vegetable origin, and that about one-seventh of this, or 8.7 per cent of the whole, is corn meal. Of the total protein consumed, animal as well as vegetable, corn meal supplies 10 per cent; of the total fat, 3.8 per cent; and of the total carbohydrates, 13.7 per cent.

At ordinary prices corn meal is among the more economical food materials. Many palatable dishes may be made simply of corn meal, salt, and water, or the meal may be combined with various other materials, as shown by the recipes given in this bulletin. (See pp. 12 to 23.) Each locality where corn is used in large amounts seems to have worked out its own peculiar dishes.

The southern cook made hoeecake, or corn pone, or ash cake, by cooking a dough of corn meal and water on a board before an open fire or baking it in the ashes. Sometimes a little fat was added. The early New Englander made similar cakes, which when baked before the fire, were sometimes basted with cream to make them richer. The New Englander also had his "hasty pudding," made by cooking corn meal in a large quantity of water—a very common staple article of diet. This was so made that when hot it was thin enough to be eaten as a mush with milk, and when cold thick enough to be fried in slices. The Italian has his polenta, which resembles hasty pudding, except that it is usually somewhat thicker and that a little fat or cheese is added, and in the eastern Mediterranean regions many corn-meal dishes are very important foods. (See p. 18.) The American Indian makes a corn bread which usually is seasoned highly.

Besides these simple dishes, various peoples have worked out combinations of corn meal with foods differing from it widely in composition. As stated above, corn meal contains protein, fat, and starch, but the protein is lower than it should be in the diet as a whole and a trifle lower even than it is in wheat. Instinctively, therefore, people seem to combine corn meal with foods in which the protein is more prominent. This is shown by the fact that almost every locality which uses corn meal in large amounts has a characteristic dish in which it is used with beans, meat, or other foods richer in protein than it is itself. Probably the best known dishes of this kind in the United States are succotash (learned from the Indians and in early times made of dry corn and beans as well as of green), the mush and milk of the earlier settlers of New England, and the hoeecake and buttermilk of the South. The nutritive value of such a dish as corn-meal mush and milk, can not, of course, be stated exactly, for it depends upon the richness of the milk, the thickness of the mush, and the proportions in which the two foods are taken. It is safe, however, to say that these two foods eaten in equal volumes, cup for cup, or tablespoon for tablespoon, make what is commonly known as a balanced ration; that is, a ration that furnishes all the substances that the body needs in the proportions in which the body can use them satisfactorily.

Another apparently instinctive attempt to combine with corn meal the nutrients which it somewhat lacks is the dish known as "scrap-ple," for which a recipe is given on page 21. This is made by cooking corn meal in the water in which pork (usually a pig's head) has

been boiled and combining this mixture with the finely chopped pork. The addition of the meat, which consists largely of protein and fat, to the corn meal, of which starch is a prominent ingredient, tends to produce a complete ration. "Stamp and go," a favorite dish among the natives of Jamaica, is made up of salt fish, lard, and corn meal (for a similar dish, see the recipe for corn-meal fish balls on p. 21), and has a nutritive value like that of scrapple. The use of cheese, which consists chiefly of protein and fat, with polenta may be considered an instinctive attempt by the Italians to satisfy the physiological food requirement by means of a single dish.

Most of the dishes mentioned above had their origin in times when life was much simpler than it is at present and when fewer dishes were served at a meal. In most American homes of the present meals consist not of one but of several dishes, and there is a considerable variety of food materials used in the course of a day or a week. When the protein foods and the fruits and vegetables are represented sufficiently in other dishes, there is, of course, no necessity for providing these in the same dish with the corn meal. Corn meal, therefore, now is used chiefly as a breakfast cereal or in the form of bread.

An important feature of a well-planned diet is attractive flavor. This has a real physiological importance because appetizing food stimulates digestion. Combining staple foods with different savory materials prevents the diet from becoming monotonous, and adding materials of distinctive flavor to mild-flavored ones makes larger quantities of the latter acceptable. These facts have been instinctively recognized wherever corn meal has been used in large quantities. The Zuni Indians have a dish which is called "hot cakes," which they make by combining corn meal with water and suet and adding a large amount of red pepper. In the United States it was a common custom in olden times to vary many of the corn-meal dishes by the addition of tart apples (see p. 13), and in Italy polenta usually is served either with a highly seasoned sauce or with cheese. When it is necessary to use corn meal very freely, the desirability of varying its flavor and texture should be kept in mind. Fried corn-meal mush, for example, offering as it does the flavor of boiled meal and also of parched meal, and being crisp on the outside and soft within, has a different taste from the mush itself, and so provides variety.

COOKING OF CORN MEAL.

Recipes for the use of corn meal that will be useful everywhere are not easy to make, for the meal used in various parts of the country differs considerably. In general the granular, which is used

more commonly in the North, requires more water and longer cooking than the water ground, which is used more generally in the South. This extra cooking is needed to soften the meal and remove the granular quality from which it gets its name, and must often be given to the meal before it is used in making bread or such dishes as waffles or doughnuts.

This process of softening corn meal for use in baking and the cooking of corn meal in water or milk for use as a mush have so much in common that they will be discussed together.

In order to produce a satisfactory flavor it seems necessary that the mush should at some time reach the boiling point. The most common way of preparing mush is to allow the water to come to the boiling point and to add the meal slowly, stirring constantly. The objection to this method is that there is considerable danger that the mush will become lumpy and oftentimes it is unpleasant for the cook to stand over a hot stove and stir the mixture sufficiently to make it smooth. A better method, therefore, is the following:

Put the corn meal, cold water, and salt together in the top of a double boiler. No stirring is necessary. Put the top of the double boiler into the lower part and allow the mush to heat slowly, cooking half an hour, or longer, if convenient. Many people cook it as long as four hours. Just before serving remove the top of the double boiler from the lower part and boil the mush for two or three minutes. In boiling it at this time there is no danger that it will lump.

This general method may be followed whenever corn meal is to be used in bread, doughnuts, or other dishes. In this case, however, the final boiling is not necessary, for the meal is sufficiently heated later.

CORN-MEAL BREAD.

To make a good yeast bread out of corn meal alone is difficult, if not impossible. In order to understand the problems involved, it is necessary to know something about the protein, particularly how it differs from the protein of other cereals commonly used in the preparation of yeast bread. It should be remembered that the word "protein" is not used here to designate any one substance of unvarying characteristics, but is applied to many mixtures of nitrogenous substances which are found in almost every natural food product. It is possible, therefore, for the protein of two food materials, corn and wheat for example, to be similar in quantity, but to differ widely in quality.

The chief proteid of wheat, "gluten," is a mixture of substances which, when combined with water, makes a peculiarly sticky and tenacious mass that tends to hold any gas which is introduced into it. Because of the presence of gluten it is possible to make a porous loaf out of wheat and water.

The protein of corn, on the other hand, is wholly lacking in the quality of tenacity, and so the somewhat granular particles of meal tend to separate rapidly. Although this is an advantage in the preparation of some dishes, as stated above, it is a disadvantage in others, for any gas which is introduced into the moist meal escapes easily without rendering the mass porous. In fact, if eggs are not used with the meal, a certain amount of flour must be introduced if the bread is to be light and porous. The early settlers of this country discovered that rye added to the corn helps to hold the gas bubbles made by the yeast and to keep the bread moist.

In a general way, corn-meal breads, though of very great variety and known by many different names, fall into three classes: Those raised by air beaten into them; those raised by baking powder or soda, and those raised by yeast. The meal is particularly adapted to the making of the first kind, for, as we have seen, there is nothing corresponding with the gluten of wheat to hold the particles together and to prevent them from being driven apart by the expansion of the air. Such breads are best made from the coarser meals and are usually very simple in character, often containing nothing more than meal, salt, and either water or milk. Sugar is sometimes added in some localities, though in others this is not considered desirable. A small amount of fat is also added sometimes. Recent carefully conducted experiments have shown that these simple breads, which are tender and light, though solid in appearance, can be satisfactorily made out of finely ground meal, if a little baking powder is added.¹ In the corn-meal breads of the second class, which are made light by the carbon dioxid given off by baking powder, or through the action of sour milk on soda, the gluten deficiency of the corn is made up for by the use of eggs, which hold the air bubbles which make it light. In breads of the third class, those raised by the carbon dioxid given off by the yeast, the gluten deficiency in the corn is supplied by the addition of some other flour, usually wheat or rye. Yeast-raised corn breads do not dry out nearly so quickly as the other types, and they are palatable either warm or cold. For these reasons they are convenient for the housekeeper who does not wish to make bread fresh for each meal.

In the pages which follow recipes are given for breads of each class. The simpler breads, like corn pone, are old types closely resembling the bread of primitive people, and such corn breads were made by the Indians. Though easy to prepare, they are nevertheless very palatable.

¹ Orig. Commun. 8. Internat. Cong. Appl. Chem. [Washington and New York], 18 (1912), Sect. VIIIc, pp. 119-127.

CORN PONE.

2 cups corn meal.	One-fourth cup wheat flour.
One-third cup water.	1 teaspoon salt.
One-third cup sour milk or buttermilk.	1 tablespoon sugar.
One-fourth teaspoon soda.	2 teaspoons baking powder.

Pour the water and milk over the corn meal in a double boiler and cook a few moments, or boil the water and pour it over the corn meal and then add the buttermilk. Sift together the flour, salt, sugar, baking powder, and soda, and add to the corn meal when it is cool. The mixture should be just stiff enough to make into cakes or "pones." If it is stiffer than this, add a little water. Form into cakes and place in a hot, well-greased pan and bake in a hot oven until brown. The cakes should be handled lightly and not pressed down after they have been placed in the pan.

WHEAT-CORN YEAST BREAD.

1½ cups milk, water, or a mixture of the two.	1 tablespoon sugar.
One-half cake yeast, dry or com- pressed.	Fat (if used), 1 tablespoon.
1½ teaspoons salt.	1 cup corn meal.
	2 cups wheat flour.

Put 1½ cups of the liquid, the corn meal, salt, sugar, and fat (if used) into a double boiler and cook 20 minutes. The liquid is sufficient only to soften the meal a little. Allow the meal to cool to about the temperature of the room and add the flour and yeast, mixed with the rest of the water. Knead thoroughly, make into a loaf, place in a pan of standard size, allow to rise until it nearly fills the pan, and bake 45 or 50 minutes.

It is hardly practicable to use a greater percentage of corn meal than this even in emergencies, for bread so made differs very little from baked mush. Less corn meal can be used, and in such a case the general method given above may be followed.

It is possible to make a yeast-raised corn bread without first cooking the corn meal. In this case not more than one cup of meal should be used to four cups of flour. In other respects the bread is mixed and baked as in the above recipe. Such bread has little noticeable corn-meal flavor. If a larger proportion of corn meal is used, the bread will seem dry.

The above recipe for wheat-corn yeast bread was worked out for use with granular corn meal from the following recipe in common use in South Carolina with old-process meal:

SOUTH CAROLINA YEAST CORN BREAD.

1½ quarts fine corn meal.	2 teaspoons salt.
2½ quarts wheat flour.	1 pint mashed sweet potatoes.
Or	1 cake yeast, dry or compressed.
2½ quarts fine corn meal.	
1½ quarts wheat flour.	

Mix 1 pint each of the corn meal and the flour and add warm water enough to form a stiff batter. Add the yeast cake, mixed with a small amount of water. Keep this sponge in a warm place until it becomes light. Scald the remaining meal with water, and as soon as it is cool enough add it to the sponge

with the flour, potatoes, and salt. The dough should be just thick enough to knead without danger of its sticking to the board. Experience will teach how much water to use to secure this end. Knead well and put in a warm place to rise. When it is light form into loaves, put into bread pans, and let it rise until its volume is doubled. Bake in a moderate oven.

A common, though not general, practice in New England was to add cooked pumpkin to the other ingredients in making such bread as this, very much as sweet potato is used in the South. The sweet potato or pumpkin changes the flavor of the bread somewhat and apparently facilitates the rising of the dough, improves the texture of the bread, and tends to keep it moist. However, if sweet potato or pumpkin, either home cooked or canned, can not be obtained conveniently, good bread can be made without it.

APPLE CORN BREAD.

2 cups white corn meal.	1 teaspoon cream of tartar.
2 tablespoons sugar.	1 $\frac{3}{4}$ cups milk.
Three-fourths teaspoon salt.	3 tart apples, pared and sliced.
1 teaspoon soda.	

Mix the dry ingredients, add the milk, and beat thoroughly. Add the apples. Pour into a well-buttered shallow pan and bake 30 minutes or longer in hot oven to soften the apples.

This could be made with dried apricots cooked in the usual manner by soaking and cooking slowly and adding a little sugar. The juice may be used as sauce.

This serves six or eight people.

CRACKLING BREAD.

1 quart corn meal.	3 teaspoons salt.
1 pint cracklings.	Boiling water.

Mix the corn meal and salt; pour over this mixture enough boiling water to moisten but not enough to make a mush. When the meal has cooled, work the cracklings into it with the fingers. Form the dough into cakes about 4 inches long, 2 inches wide, and 1 inch thick; bake for 30 minutes. This bread, because of its large percentage of fat, is eaten without butter, and should be served very hot.

"Cracklings," like "scraps," is a name given to the crisp, brown meat tissue left after lard is "tried out." They consist of connective tissue with a large amount of fat adhering to it. Much of the fat can be removed by pressure. This is best done by squeezing them in a thin cloth while they are still warm or after they have been reheated.

Because of the large amount of fat in this bread, it is better food for persons who are working hard out of doors than for those of sedentary occupations. This makes 12 cakes.

CRISP CORN-MEAL CAKE.

3 cups milk.	1 $\frac{1}{2}$ cups corn meal.
1 teaspoon salt.	

Mix the ingredients and spread on shallow buttered pans to a depth of about one-fourth of an inch. Bake in a moderate oven until crisp.

This will serve six people.

SOUR-MILK CORN BREAD.

2 cups corn meal.	1½ teaspoons salt.
2 cups sour milk.	2 eggs.
2 tablespoons butter.	1 teaspoon soda.
2 tablespoons sugar, white or brown.	1 tablespoon cold water.

There are two ways of mixing this bread. By the first the meal, milk, salt, butter, and sugar are cooked in a double boiler for about 10 minutes. When the mixture is cool, the eggs are added well beaten and the soda dissolved in the water. By the other method all the dry ingredients, including the soda, are mixed together, and then the sour milk and eggs well beaten and the butter are added. If the second method is followed, the cold water is not needed. The bread should be baked in a shallow iron or granite pan for about 30 minutes.

Since the bread made by the first method is of much better texture, that method is to be preferred, except in cases where there is not time for the necessary heating and cooling of the meal.

Buttermilk may be substituted for the sour milk, in which case the butter should be increased slightly; or sour cream may be used and the butter omitted.

This serves six people.

SPIDER CORN BREAD.

1½ cups corn meal.	1 teaspoon salt.
2 cups sour milk.	2 eggs.
1 teaspoon soda.	2 tablespoons butter.

Mix the dry ingredients. Add the eggs well beaten and the milk. Place the butter in a frying pan, melt it, and grease the pan well. Heat the pan and turn in the mixture. Place in a hot oven and cook 20 minutes.

This serves six people.

SWEET-MILK CORN BREAD.

2 cups yellow corn meal.	1 teaspoon salt.
1 cup wheat flour.	2 eggs.
2 cups milk.	3 teaspoons baking powder.
One-half cup sugar.	

Sift together the corn meal, flour, sugar, salt, and baking powder. Add the eggs well beaten and the milk and bake one-half hour in a moderate oven.

In this case, as in the recipe for sour-milk corn bread, the corn meal can be cooked for a short time with the milk if a softer bread is desired.

This serves eight people.

CORN-MEAL MUFFINS.

One-half cup corn meal.	1 tablespoon melted butter.
1 cup wheat flour.	1 teaspoon salt.
3 teaspoons baking powder.	Three-fourths cup milk.
2 tablespoons sugar.	1 egg.

Mix and sift the dry ingredients; add the milk gradually, the egg well beaten, and the melted butter; bake in a hot oven in buttered gem pans 25 minutes.

This serves four people.

CORN MUFFINS WITH DATES.

- | | |
|----------------------------|-----------------------------|
| 1 cup white corn meal. | 1 cup wheat flour. |
| 2 tablespoons brown sugar. | 4 teaspoons baking powder. |
| 1 teaspoon salt. | 1 egg. |
| 2 tablespoons butter. | One-half cup dates cut into |
| 1½ cups milk. | small pieces. |

Cook together the first five ingredients for 10 minutes in a double boiler. When cool, add the eggs, the dates, and the flour sifted with the baking powder. Beat thoroughly and bake in muffin pans in a quick oven or bake in a loaf. The bread will keep in good condition longer if the dates are cooked with the corn meal and other ingredients in the double boiler.

Variety may be secured by cooking the dates with the other ingredients in the double boiler.

This serves six people.

CUSTARD CORN CAKE.

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|-----------------------|----------------------------|
| 2 eggs. | 1 cup sweet milk. |
| One-fourth cup sugar. | 1½ cups corn meal. |
| 1 teaspoon soda. | One-third cup wheat flour. |
| 1 teaspoon salt. | 2 tablespoons butter. |
| 1 cup sour milk. | 1 cup cream. |

Beat the eggs and sugar together thoroughly. Sift the flour, soda, and salt together and mix with the meal. Mix all the ingredients but the cream and butter. Melt the butter in a deep pan, using plenty on the sides. Pour in the batter, add (without stirring) a cup of cream, and bake 20 to 30 minutes. When cooked there should be a layer of custard on top of the cake or small bits of custard distributed through it.

For economy's sake milk may be used in place of the cream in this recipe. This serves six people.

CORN-MEAL ROLLS.

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| 1½ cups wheat flour. | 1 egg. |
| Three-fourths cup corn meal. | One-half cup milk. |
| 3 teaspoons baking powder. | 1 teaspoon salt. |
| 2 tablespoons butter. | |

Sift together the flour, baking powder, and salt, and mix with the meal. Rub the butter into the dry ingredients. Beat the egg, add the milk, and add this mixture to the dry ingredients. Add more milk if necessary to make a soft dough. Roll out on a floured board, handling lightly. Cut with a round biscuit cutter, fold like Parker House rolls, and bake in a quick oven.

This makes 14 small rolls.

RAISED CORN-MEAL MUFFINS.

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| 1 cup scalded milk. | One-fourth yeast cake. |
| 3 tablespoons butter or other fat. | One-fourth cup lukewarm water. |
| 4 tablespoons sugar. | 1 cup corn meal. |
| 1 teaspoon salt. | 1½ cups wheat flour. |

Add shortening, sugar, and salt to the milk. When lukewarm, add yeast dissolved in the water, corn meal, and flour. Beat well; let rise overnight. Beat well and half fill greased muffin rings. Let rise until nearly double and bake in a hot oven for half an hour.

This makes 12 muffins.

SOFT CORN BREAD.

Two-thirds cup rice.	2 or 3 eggs.
One-half cup white corn meal.	2 tablespoons butter.
3 cups milk or milk and water mixed.	1 teaspoon salt.

Mix the rice, meal, and salt with the milk in the top of a double boiler, and cook until the rice is nearly soft. Add the butter and the eggs well beaten and transfer to a greased granite baking pan. Bake in a moderate oven for an hour. Serve in the dish in which it is baked.

This serves six people.

SPOON CORN BREAD.

2 cups water.	1 tablespoon butter.
1 cup milk.	1 teaspoon salt.
1 cup white corn meal.	2 eggs.

Mix the water and the corn meal and bring slowly to the boiling point and cook 5 minutes. Add the eggs well beaten and the other ingredients. Beat thoroughly and bake in a well-greased pan for 25 minutes in a hot oven. Serve from the same dish with a spoon.

This serves six people.

STEAMED CORN-MEAL BREAD.

2 cups yellow meal.	1½ teaspoons soda.
1 cup wheat flour.	1½ teaspoons salt.
2½ cups sour milk.	One-half cup molasses.

Sift together the flour, soda, and salt, and stir in the corn meal, mixing thoroughly. Add the molasses and sour milk. Pour into a well-buttered mold, which should not be more than two-thirds full. A lard pail is a good substitute for the mold. Cover closely and steam 5 hours.

Half this recipe makes just the right amount to steam in a 1-pound coffee tin. This serves eight people.

BOSTON BROWN BREAD.

1 cup corn meal.	1 teaspoon salt.
1 cup rye meal.	Three-fourths cup molasses.
1 cup Graham flour.	2 cups sour milk, or
2½ teaspoons soda.	1½ cups sweet milk.

Mix and sift the dry ingredients and add the molasses and milk. Beat thoroughly and steam 3½ hours in well-buttered, covered molds. Remove the covers and bake the bread long enough to dry the top.

This may be made also with 1½ cups corn meal and rye meal and no Graham flour.

This serves eight people.

BOSTON BROWN BREAD WITH FRUIT.

Follow recipe for Boston brown bread, adding to the dry ingredients a cup of seeded and shredded raisins or prunes or a cup of Zante currants.

This serves eight people.

CORN-MEAL PUFFS, GRIDDLECAKES, AND WAFFLES.

The peculiar granular consistency of corn meal, which is a disadvantage under some circumstances, is an advantage in making such dishes as griddlecakes and waffles, for it renders them very tender.

CORN-MEAL PUFFS.

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| 1 pint milk. | One-half teaspoon salt. |
| One-third cup corn meal. | 4 eggs. |
| 4 tablespoons sugar. | Grated nutmeg (if desired). |

Cook the milk and meal together 15 minutes with the salt and sugar. When cool add the eggs well beaten. Bake in cups. Serve with stewed fruit or jam. This serves six people.

CORN-MEAL FRITTERS.

By increasing the corn meal in the above recipe by half (i. e., to one-half cup) the batter is made stiff enough to be dropped into hot fat and fried. This serves six people.

CORN-MEAL PANCAKES.

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| 2 cups wheat flour. | One-third cup sugar. |
| One-half cup corn meal. | 1½ cups boiling water. |
| 1½ tablespoons baking powder. | 1½ cups milk. |
| 1½ teaspoons salt. | 1 egg. |
| 1 tablespoon melted butter. | |

Add meal to boiling water and boil 5 minutes; turn into bowl, add milk and remaining dry ingredients mixed and sifted, then the egg well beaten, and butter. Cook on a greased griddle.

This serves six people.

CORN MEAL AND WHEAT WAFFLES.

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| 1½ cups water. | 1½ tablespoons baking powder. |
| One-half cup white corn meal. | 1½ teaspoons salt. |
| 1½ cups milk. | Yolks 2 eggs. |
| 3 cups wheat flour. | Whites 2 eggs. |
| 3 tablespoons sugar. | 2 tablespoons melted butter. |

Cook the meal in boiling water 20 minutes; add milk, dry ingredients mixed and sifted, yolks of eggs well beaten, butter, and whites of eggs beaten stiff. Cook on a greased waffle iron. These waffles are considered by most people better than those made with wheat flour only.

This serves six people.

CORN MEAL AND RICE WAFFLES.

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| One-half cup corn meal. | 1 tablespoon melted butter. |
| One-half cup wheat flour. | One-half teaspoon soda. |
| 1 cup boiled rice. | 1 teaspoon salt. |
| 2 eggs well beaten. | 1 cup sour milk. |

Sift together the flour, soda, and salt. Add the other ingredients and beat thoroughly.

This serves six people.

BUTTERMILK WAFFLES.

3 cups water.	2 tablespoons butter.
2 cups corn meal.	2 teaspoons salt.
2 cups wheat flour.	1½ teaspoons soda.
1 cup sweet milk.	Buttermilk or sour milk enough
4 eggs.	to make a thin batter.

Cook the meal, water, salt, and butter together in a double boiler for 10 minutes. When the mush is cool add the eggs, beaten separately until very light. Sift the flour and soda together. Add the flour and the sweet milk alternately to the corn mixture. Finally add the buttermilk. This mixture is improved by standing a short time.

This serves 10 people.

CORN-MEAL MUSHES.**PLAIN MUSH No. 1.**

1 cup corn meal.	1 teaspoon salt.
3½ cups water.	

Bring the salted water to the boiling point in the top of a double boiler. Pour the corn meal slowly into the water, stirring constantly. Cook 3 minutes. Put the upper part of the boiler into the lower part and cook the mush half an hour and as much longer as convenient. Long cooking improves the taste and probably adds to the thoroughness with which the mush is digested.

The housewife who has no double boiler can make one by using two saucepans of such size that one can be set inside of the other.

PLAIN MUSH No. 2.

1 cup corn meal.	4½ cups water, milk, or
1 teaspoon salt.	milk and water.

Bring the salted water to the boiling point; add the meal slowly, stirring all the time. Put into the fireless cooker and leave for 5 to 10 hours. If the pail holding the mush is set into another pail containing water before being placed into the cooker, the heat will be retained longer. Whether this is necessary or not depends upon the efficiency of the cooker.

PLAIN MUSH No. 3.

1 cup meal.	4 cups milk, whole or
1 teaspoon salt.	skim, or
3½ cups water, or	4 cups milk and water.

Put the ingredients into the top of the double boiler cold and cook 1 hour or longer. If convenient, just before serving bring the mush to the boiling point. This improves its texture and also its flavor.

POLENTA.

This dish, which is common in Italy, differs little, except in name, from corn meal mush, though it is served in very different ways. Sometimes cheese is added during the cooking. Polenta is often reheated either with tomato sauce, or a meat gravy left over from a meal or with a meat gravy made from a small amount of meat bought for the purpose, or with half tomato sauce and half meat gravy. In any case, the dish is improved by sprinkling the cooked polenta with cheese. When the polenta is to be reheated in gravy, it is well to cut it into small pieces in order that the gravy may be well distributed through the dish.

SAUCES FOR POLENTA.

TOMATO SAUCE.

2 tablespoons butter.	1 cup thick strained tomato juice
2 tablespoons flour.	Salt and pepper.

Melt the butter; cook the flour thoroughly in it; add the tomato juice and seasonings; and cook until smooth, stirring constantly.

SAVORY SAUCE.

Take 2 ounces of salt pork, bacon, or sausage. If bacon or pork is used, cut it into small pieces. Heat until crisp but not burned. In the fat which tries out of the meat, cook a small amount of finely chopped onion and red or green pepper, being careful not to burn them. Add 1 cup of thick tomato juice or a larger amount of uncooked juice, and cook the mixture until it is reduced to a smaller amount. Season with salt. To this sauce capers, mushrooms, or finely chopped pickle may be added.

FRIED CORN-MEAL MUSH.

The custom of packing hasty pudding in granite pans, cutting it into slices, and frying it, is too common to call for special mention here. A less common method in this country is that employed in Italy, where polenta is usually spread out in thin layers on a board and cut into small blocks. These blocks are egged and crumbed, and fried in deep fat. Another method is to mix corn meal in three times its volume of water and to cook it in water only long enough to form a mush, and to complete the cooking by frying the meal in butter or other fat. This is not so stiff as ordinary fried corn-meal mush, and has the advantage of requiring a shorter time for its preparation, as the temperature of fat suitable for frying is far greater than that of boiling water.

CORN-MEAL MUSH WITH FRUIT.

Corn-meal mush is often served with dried fruits, particularly with figs and dates. In preparing such fruit for use with the mush, it usually is necessary to soften it. This can be accomplished easily by washing the fruit and then heating it in a slow oven. As a result of the heat the water remaining on the fruit is absorbed and the fruit softened and also dried on the surface.

CORN-MEAL MUSH WITH CHEESE.

For this dish yellow corn meal is generally used. For a mush made with 1 cup of yellow corn meal the usual allowance is one-half cup, or 2 ounces, of grated cheese. There is, however, no limit to the quantity of cheese which can be added, and the addition of the cheese tends not only to make a more highly nitrogenous and nourishing dish but also to make a dish which can be eaten without the addition of butter or cream. Like the ordinary corn-meal mush, it is often fried either in deep fat, after having been egged and crumbed, or in a small amount of fat.

CHEESE PUDDING.

1 quart boiling water.	One-half pound yellow corn
1 tablespoon salt.	meal.
One-half cup milk.	One-half pound cheese.

Into the boiling, salted water pour the corn meal slowly, stirring constantly, and allow to boil 10 minutes; then add most of the cheese and cook 10 minutes

more, or until the cheese is melted. Add one-half cup of milk and cook a few minutes. Pour into a greased baking dish. Brown in the oven. This dish is improved by grating a little hard cheese over the top just before it is baked.

This pudding can be cut into slices when cold and fried.

This serves four to six people.

BUTTERMILK CORN-MEAL MUSH.

White corn meal cooked in buttermilk makes a dish which resembles cottage cheese in flavor. It may be eaten hot, but is especially palatable when served very cold with cream. For this purpose it is sometimes molded in cups. In making it, allow 1 part of corn meal to 6 parts of buttermilk, and 1 teaspoon of salt to each cup of meal.

BAKED CORN-MEAL MUSH.

When corn-meal mush is partly done pour it into shallow pans, making a layer not more than 2 inches thick, and cook in an oven until it is well browned. The product secured is very similar to the original "Johnny cake," which seems to have been simply a corn-meal mush cooked in the oven, or, in some localities, fried. The name, however, has with time come to be applied to a very large variety of corn breads.

CORN MEAL AND MEAT DISHES.

A number of dishes are made from corn meal and meat or fish in which mush is used, or which resemble mush in some particulars. Recipes for such dishes follow:

CORN-MEAL MUSH WITH PORK.

1 pound lean pork, part meat	1 teaspoon salt.
and part bone.	One-half teaspoon powdered
1 cup corn meal.	sage.
	Water.

Cook the pork in water until the meat can be removed easily from the bone. Remove the meat, cool the broth, and remove the fat. Reduce the broth to about a quart, or add water enough to bring it up to this amount, and cook the corn meal in it. Add the meat finely chopped and the seasonings. Pack in granite bread tins. Cut into slices and fry. Beef may be used in the same way.

This serves six people.

ROAST PORK WITH BATTER PUDDING.

A dish corresponding to the Yorkshire pudding which is frequently served with roast beef can be made out of corn meal to serve with roast pork.

One-fourth cup corn meal.	One-half teaspoon salt.
1 cup milk.	2 eggs.

Place the milk, corn meal, and salt in the top of a double boiler and cook them about 10 minutes, or until the meal has expanded to form a thorough mixture. After the mixture has cooled, add the eggs well beaten. Grease gem tins thoroughly, allowing to each about 1 teaspoon of fat from the roast pork. Bake in a moderate oven, basting occasionally with the drippings of the pork.

This serves four people.

CORN-MEAL SCRAPPLE.

1 pig's head split in halves.
2 cups corn meal.

Salt and sage.

Follow the above directions for cooking corn meal with pork, but use double the amount of water.

CORN-MEAL FISH BALLS.

2 cups cold white corn meal mush.
1 cup shredded codfish.

1 egg.
1 tablespoon butter.

Pick over the codfish and soak it to remove salt, if necessary. Combine the ingredients and drop by spoonfuls into hot fat. Drain on porous paper. These codfish balls compare very favorably in taste with those made with potato and are prepared more easily and quickly. The mush must be as dry as possible.

This makes 12 fish balls.

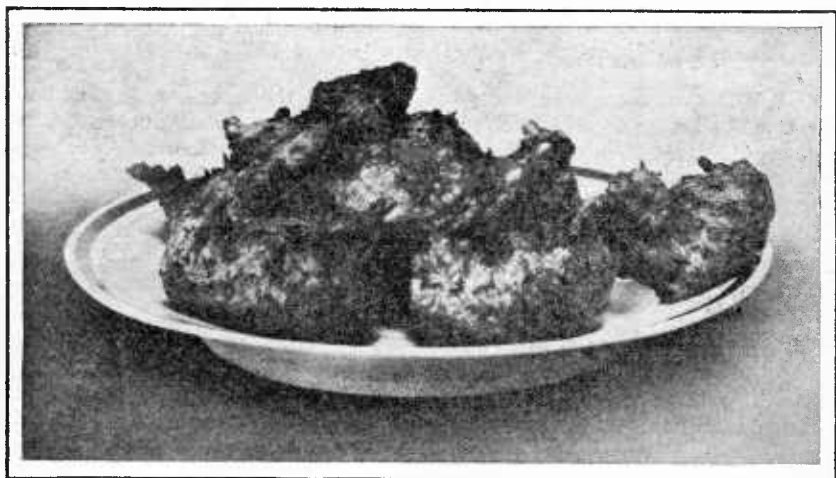


FIG. 1.—Corn-meal fish balls.

ROAST PORK OR FRIED CHICKEN WITH CORN-MEAL MUSH.

Blocks of fried corn-meal mush are sometimes served with roast pork, and are a common accompaniment for fried chicken, particularly in the Southern States. The mush is made by the usual method, is cooled and cut into slices, and fried a delicate brown either in a greased pan or in deep fat.

For a boiled corn-meal and apple dumpling to be eaten with roast pork, see recipe below.

CORN-MEAL PUDDINGS.

There is a large variety of popular and very nutritious puddings made chiefly out of milk, to which a small amount of some starchy substance has been added. The substance most frequently used is probably rice, but corn meal, too, has always been commonly used. The proportion of cereal to milk is always as low as 1 to 12, and sometimes as low as 1 to 16; that is one-fourth to one-third cup of

cereal to 3 or 4 cups of milk. The only other ingredients are sugar or molasses and some flavoring material. Other puddings are made by combining corn meal with milk and eggs.

INDIAN PUDDING.

5 cups milk.	1 teaspoon salt.
One-third cup corn meal.	1 teaspoon ginger.
One-half cup molasses.	

Cook milk and meal in a double boiler 20 minutes; add molasses, salt, and ginger; pour into buttered pudding dish and bake 2 hours in slow oven; serve with cream.

This serves eight people.

CORN MEAL AND FIG PUDDING.

1 cup corn meal.	1 cup finely chopped figs.
1 cup molasses.	2 eggs.
6 cups milk (or 4 of milk and 2 of cream).	1 teaspoon salt.

Cook the corn meal with 4 cups of milk, add the molasses, figs, and salt. When the mixture is cool, add the eggs well beaten. Pour into a buttered pudding dish and bake in a moderate oven for 3 hours or more. When partly cooked add the remainder of the milk without stirring the pudding.

This serves eight or ten people.

CORN MEAL AND APPLE PUDDING.

For the figs in the above recipe substitute a pint of finely sliced or chopped sweet apples.

This serves eight or ten people.

CORN-MEAL CAKES.

In making cakes it is often possible to substitute corn meal for part of the flour. In some of the cases given here, in making gingerbread, for example, there is no special advantage in using it, but it is well to know that it can be used in emergencies. In baking doughnuts, however, there is a decided advantage in substituting corn meal for part of the flour, for doughnuts so made are much more likely to be tender than those made with wheat flour alone.

INDIAN-MEAL DOUGHNUTS.

Three-fourths cup milk.	2 eggs well beaten.
1½ cups very fine white corn meal.	1 teaspoon cinnamon.
1½ cups wheat flour.	2 teaspoons baking powder.
One-fourth cup butter.	1 level teaspoon salt.
Three-fourths cup sugar.	

Put milk and meal into a double boiler and heat together for about 10 minutes. Add the butter and sugar to the meal. Sift together the wheat flour, baking powder, cinnamon, and salt. Add these and the eggs to the meal. Roll out on a well-floured board; cut into the desired shapes; fry in deep fat; drain and roll in powdered sugar.

This makes 30 medium-sized doughnuts.

MOLASSES CORN CAKE.

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|--------------------------|---------------------|
| 2 cups yellow corn meal. | 1 cup sour milk. |
| One-half cup molasses. | 1½ cups sweet milk. |
| One-half cup sugar. | 1 cup wheat flour. |
| 2 tablespoons butter. | 1½ teaspoons soda. |
| 1 teaspoon salt. | 1 egg. |

Mix the first seven ingredients in a double boiler and cook over hot water. Cook for about 25 minutes after the mixture has become hot. After it has cooled add the wheat flour and soda, thoroughly sifted together, and the egg well beaten. Bake in a shallow tin.

This serves six people.

CORN-MEAL GINGERBREAD.

To the above recipe add 1½ teaspoons ginger, 1½ teaspoons cinnamon, and one-half teaspoon cloves, sifting them with the flour.

This serves six people.

FRUIT GEMS.

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|------------------------------|-----------------------------|
| One-half cup corn meal. | 1 cup milk. |
| 1 cup wheat flour. | 1 cup currants or raisins. |
| 3 teaspoons baking powder. | 2 eggs. |
| 6 tablespoons sugar. | 1 tablespoon flour reserved |
| 2 tablespoons melted butter. | for flouring currants or |
| 1 teaspoon salt. | raisins. |

Mix and sift the dry ingredients; add the milk gradually, the eggs well beaten, melted butter, and raisins, which have been floured. Bake in a hot oven in buttered gem pans 25 minutes.

This makes 12 cakes.

How To Do It

DO YOU WANT practical suggestions on how to build a silo, a hog house, a poultry house, a potato-storage house, or how to make a fireless cooker, or other farm home convenience? Are you seeking ideas on how to prepare vegetables for the table, how to care for food in the home, how to bake bread and cake and other appetizing foods in an efficient and economical manner? Is there some practical question about your corn or wheat or cotton or other crops, or about your poultry or live stock, to which you are seeking an answer? The answers to thousands of such questions, and practical suggestions for doing thousands of things about the farm and home, are contained in over 500 Farmers' Bulletins, which can be obtained upon application to the Division of Publications, United States Department of Agriculture, Washington, D. C.